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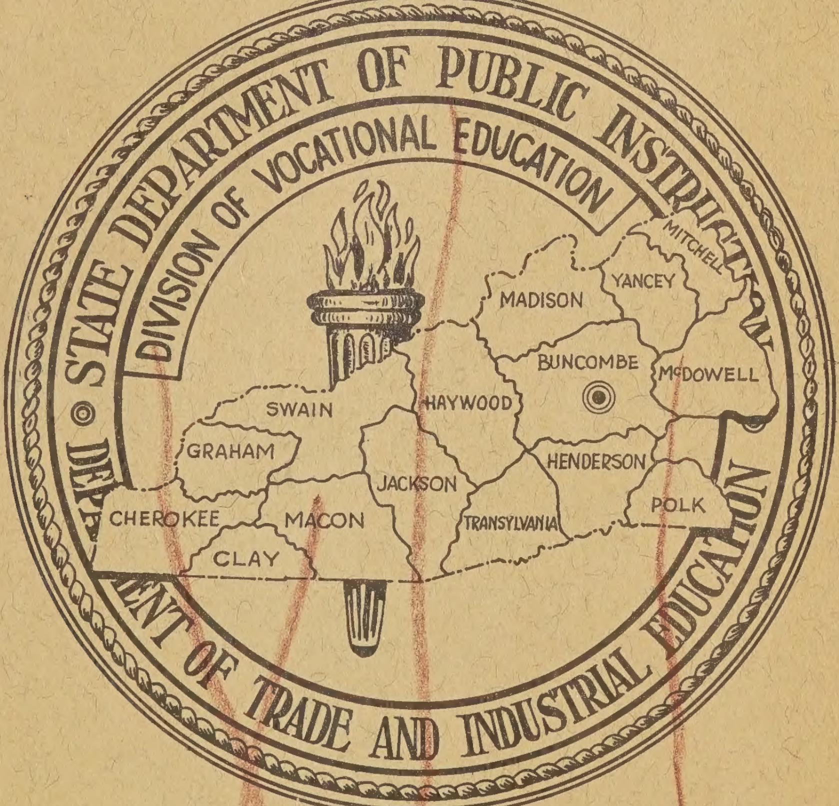
Learn to Earn thru TRADE and TECHNICAL TRAINING

CATALOG 1961-1962


STATE DEPARTMENT OF PUBLIC INSTRUCTION
DIVISION OF VOCATIONAL EDUCATION
DEPARTMENT OF TRADE AND INDUSTRIAL EDUCATION
MITCHELL
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ASHEVILLE - BUNCOMBE

INDUSTRIAL EDUCATION CENTER

TECHNICIAN AND TRADE PREPARATORY TRAINING

Offered By

ASHEVILLE-BUNCOMBE INDUSTRIAL EDUCATION CENTER

Operated Under

The North Carolina State Department of Public Instruction
Division of Vocational Education
Department of Trade and Industrial Education

By

Asheville City School System

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Donald W. White	Air Conditioning-Sheet Metal-Refrigeration

1961-62 CENTER CALENDAR

Fall Quarter

September	5	Tuesday	Day school classes begin; fees must be paid
	6	Wednesday	Last day Sept. fees accepted from day students
	11	Monday	Night classes begin; fees must be paid
	12	Tuesday	Last night Sept. fees accepted from night students
	20	Wednesday	Hourly paid instructors turn in time sheets
October	2	Monday	Upgrading classes begin; day and evening fees accepted
	3	Tuesday	Upgrading classes begin; last time Oct. fees accepted
	13	Friday	Western District NCEA
	20	Friday	Hourly paid instructors turn in time sheets
November	1	Wednesday	Day and evening fees must be paid
	2	Thursday	Last time day and evening Nov. fees accepted
	20	Monday	Hourly paid instructors turn in time sheets
	22	Wednesday	Thanksgiving holidays begin at end of school day
	27	Monday	Resume regular schedule
	30	Thursday	End of fall quarter

Winter Quarter

December	1	Friday	Registration and beginning day for winter quarter
	4	Monday	Day and evening fees must be paid
	5	Tuesday	Last time Dec. fees accepted
	18	Monday	Hourly paid instructors turn in time sheets
	22	Friday	Begin Christmas holidays at end of school day
January	2	Tuesday	Resume regular schedule; day and evening fees must be paid
	3	Wednesday	Last time day and evening Jan. fees accepted
	15	Monday	Upgrading classes begin
	16	Tuesday	Upgrading classes begin
	19	Friday	Hourly paid instructors turn in time sheets
February	5	Monday	Day and evening fees must be paid
	6	Tuesday	Last time day and evening Feb. fees accepted
	20	Tuesday	Hourly paid instructors turn in time sheets
March	2	Friday	End of winter quarter

Spring Quarter

March	5	Monday	Registration and beginning day for spring quarter Day and evening fees must be paid
	6	Tuesday	Last time day and evening Mar. fees accepted
	20	Tuesday	Hourly paid instructors turn in time sheets

April	2	Monday	Day and evening fees must be paid
	3	Tuesday	Last time day and evening April fees accepted
	18	Wednesday	Hourly paid instructors turn in time sheets
	19	Thursday	Begin Easter holidays at end of school day
	24	Tuesday	Resume regular schedule
May	1	Tuesday	Day and evening fees must be paid
	2	Wednesday	Last time day and evening May fees accepted
	18	Friday	Hourly paid instructors turn in time sheets
	29	Tuesday	End of spring quarter

Summer Quarter

June	1	Friday	Registration and beginning day of summer quarter
	4	Monday	Day and evening fees must be paid
	5	Tuesday	Last time day and evening June fees accepted
	20	Wednesday	Hourly paid instructors turn in time sheets
July	2	Monday	Day and evening fees must be paid
	3	Tuesday	Last time day and evening July fees accepted
	4	Wednesday	Independence Day holiday
	20	Friday	Hourly paid instructors turn in time sheets
August	1	Wednesday	Day and evening fees must be paid
	2	Thursday	Last time day and evening August fees accepted
	17	Friday	Hourly paid instructors turn in time sheets End of summer quarter

Fall Quarter

September	4	Tuesday	Registration and beginning of fall quarter

The Center will follow the same schedule for inclement weather as announced for the Asheville City Schools.

VETERAN STUDENTS

Qualified veterans are admitted for training and are approved upon presentation of the Certificate of Eligibility issued by the Veterans' Administration. Students will be accepted under Public Law 550 or Public Law 16-610. Veterans under Public Law 550 will be required to pay all fees to the Center as listed under "Fees and Expenses" on the dates specified by the calendar. The Veterans' Administration will pay all fees to the Center for veterans under Public Law 16-610.

ASHEVILLE-BUNCOMBE INDUSTRIAL EDUCATION CENTER

In 1957 the North Carolina State Legislature made possible a program of increased technical training through the formation of Industrial Education Centers. It was felt that if North Carolina was to achieve its rightful position in the expanding industrial and technological era well-equipped training centers would be needed to prepare the youth of today to meet the demands of present industry and of industries it is hoped will locate here in the future.

After thorough surveys, both state and local, and a complete analysis of the present needs and future trends for technical-industrial training, Asheville was selected as one of the twenty locations for Industrial Education Centers.

In the bond election of 1959 the people of Asheville and Buncombe County gave their approval for this area to proceed with the construction of an Industrial Education Center. The approved $300,000 was spent for site development and construction of the buildings. The equipment and the salaries of the instructional staff are furnished by the state with aid from federal funds. It is estimated that the equipment and instructional materials double the cost of the buildings.

The Industrial Education Center is located in two modern buildings on a twenty-one acre tract of land off Victoria Road, adjacent to Lee Edwards High School. The entire 30,000 square feet of floor space is specifically designed to house a vocational program. There are well-lighted classrooms, large shops and laboratories equipped with test and production-type equipment which enable the Center to offer courses providing shop experiences as well as classroom instruction.

The Center provides an advanced curriculum in both vocational and technical trade and industrial subjects, supplementary to the curriculum in the high school but below the college level. Buncombe County and Asheville City senior high school youth are eligible for the tuition-free trade and technical training in one of several trades, providing they have the necessary interest and mechanical ability to profit from this type of training. The day classes are also open to out-of-school youth, sixteen years of age, and older adults. The specific function is to offer instruction which will prepare selected individuals for entrance into and progress in suitable wage-earning employment in trade and industrial pursuits.

Shops and laboratories provide facilities to give our youth and adults the related technical training. These various courses of study are organized under the State Department of Trade and Industrial Education with the assistance of advisory committees representing industry.

High school students attend their regular high schools for one-half day to receive their academic instruction and commute to the Center to receive their vocational courses the other half day. They are granted high school credit for their class and shop work in the Industrial Education Center. Out-of-school youth attend either one-half day or a full school day.

While the Center is administered by the Asheville City Board of Education in cooperation with the Buncombe County Board of Education under the auspices of the State Board of Education and the Department of Trade and Industrial Education, it is intended as a Center to serve fifteen Western North Carolina counties.

ENTRANCE PROCEDURES

1. Application for admission is made at the Office of Director, Industrial Education Center, 340 Victoria Road, Asheville, North Carolina.
    - A. The application form must be filled out in its entirety and submitted for consideration.
    - B. A transcript of high school credits or certificate showing equivalency test passed must be submitted.
    - C. Any tests or conference required must be completed and the results submitted.

2. Applications and credentials will be examined by the director or personnel working under his direction and the application either accepted or rejected.

3. The student will be notified as to his acceptance or rejection.
    - A. If accepted his notice will include: the date and time he is to report; fees which must be paid when he reports; supplies, clothing, or tools needed when he starts.
    - B. If for any reason a student cannot report on the date and at the time specified, immediate notice must be given to the director's office, Industrial Education Center.

4. Enrollment will be closed after a class has been in operation five days or at the time any class membership is filled. In all adult courses the curriculum is arranged so a student may enroll at the beginning of any quarter if membership allows.

5. Regular high school students will be enrolled in accordance with the general high school class scheduling plan.
    - A. They will receive a notice of any fees, clothing, supplies, or tools needed upon entering class.
    - B. No high school enrollment will be accepted until the student has conferred with the Industrial Education Center counselor or director.

6. Part-time (day or evening) enrollments will be available for upgrading people employed in the area industries.
    - A. Notice will be given to area industries of classes scheduled.
    - B. Students may be enrolled upon their own request or upon the request of their supervisors.
    - C. Notices will contain enrollment date, fees, or supplies required.
    - D. Payment of fees and class attendance will be needed to complete enrollment.

MINIMUM REQUIREMENTS

1. The applicant must have reached age sixteen or over and the level of maturity and understanding necessary to profit from the training involved.

2. He must be physically able to perform the duties of the occupation for which training application is made.

3. He must have satisfactorily completed his school program up to the tenth grade if presently enrolled in school, or to have completed the tenth grade if not now enrolled in school. Equivalency tests may be used to waive educational requirements.

4. He must be able to meet (through previous school training or equivalency tests) the prerequisites for the occupational training area.

5. The student must be able to meet his financial needs for the time required to complete his course.

6. The student must have suitable educational, work, and personal references.

7. He must be a citizen of the United States.

8. The scores on the student's General Aptitude Test Battery must meet the standards required for his particular field of training.

9. For upgrading courses the only requirements are that the applicant be over eighteen years of age, employed in a trade related to the training applied for or be able to benefit from the training.

SPECIAL REQUIREMENTS

1. For the student enrolling in technician or trade classes the scores on his General Aptitude Test Battery, administered by the Employment Commission, must meet the standards required of the field and type of training desired.

2. Students enrolling in electronics must have completed physics and algebra. It is recommended that all electronics students plan to complete at least algebra I and II and plane geometry.

3. Machine shop students should have completed algebra I before enrolling. Algebra I and II and plane geometry are recommended for all students planning to become technicians or to serve an apprenticeship.

4. A minimum of shop math is required before completion of training for all trade students, and it is recommended that all complete at least mechanical drawing I.

5. Where waiver of any requirement is desired a request must be made in writing to the director of the Center. All such requests will be acted on by the director with the advice of concerned instructors.

6. Special requirements may be made for various courses as the need occurs.

CREDIT FOR PREVIOUS TRAINING

Students may transfer from other North Carolina Industrial Education Centers offering like courses with no loss of time or credit. Transfer from other schools will be accepted and credit given according to the amount of training covered as determined by the administration of the Asheville-Buncombe Industrial Education Center.

In some cases a student may be given some training time credit for industrial experience. The amount of credit will be determined by examination by qualified members of the advisory committee.

FEES AND EXPENSES

Registration Fee

A registration fee of $2.00 is required of all students and must be paid before registration is deemed complete. In case of re-entrance in the same course, a fee of $1.00 will be charged. Registration fees can not be refunded.

Instructional Supply Fees

1. High school students - cost of materials as determined by instructor.
2. Adult fifteen hour per week students - $7.50 per month.
3. Adult thirty hour per week students - $10.00 per month.
4. Forty hour upgrading classes - $2.00 registration fee.
5. Short term pre-employment - based on the number of hours per week.

Payment Date

All fees are due on the dates specified in the school calendar unless other arrangements are made with the director. In case of withdrawal, monthly fees may not be refunded after the tenth of the month. Refunds will be made on a prorated basis.

Textbooks

Textbooks are sold at cost to all students. Each course outline lists the books required.

Tools and Personal Equipment

All major tools are furnished by the Center. Purchase of a few small personal tools and safety glasses will be required in some courses. Each student will be expected to keep himself supplied with clean shop clothing. Pencils, pens, paper, notebooks, et cetera must be furnished by the student.

WITHDRAWALS

Any student who must withdraw because of illness or personal hardship (if his work has been satisfactory) may re-enter at the beginning of the same period as his withdrawal in the next class offered in his field.

A student may be dismissed from school for failure to achieve a passing grade for two grade periods or for infraction of the rules stated in the school regulations. Re-entrance of dismissed students will be at the discretion of the director. A failing grade for one report period will automatically place the student upon probationary standing for the following report period.

CERTIFICATION

Certificates are issued by Asheville City Schools and the State Department of Public Instruction for the various types and kinds of courses.

Grading

Grades will be issued at the end of each quarter.

A------------------94-100 Excellent
B------------------85-93 Good
C------------------77-84 Average
D------------------70-76 Low
E-------------------0-70 Failure
Inc-----------------Issued where excessive absences have occurred due to illness or where illness or personal hardship has caused a withdrawal.

A certificate of satisfactory completion is issued in lieu of a grade in upgrading courses.

A permanent record of all grades is kept by the Center. Transcripts are available for a $1.00 fee.

RULES OF CONDUCT

1. All safety regulations must be observed. Repeated violations will be cause for dismissal.
2. Students are expected to be in class on time. Any tardy of less than sixty minutes will be considered as one hour unexcused absence and must be made up.
3. If a student is absent three or more consecutive days without informing the school, he will be considered as dropped from the rolls.
4. No more than two unexcused absences will be allowed in any calendar month. An excused absence is regarded as one caused by personal illness or death in the family. The school reserves the right to require a statement from a physician for any extended absence.
5. Vehicles may be moved on school property only on the expressed permission of the school authorities and then at speeds not in excess of 10 miles per hour.
6. No liquor or narcotics will be allowed on the premises, and any student under the influence of alcohol or narcotics while on the premises will be subject to dismissal.
7. Smoking will not be permitted in the buildings at any time except in the student lounge.
8. The administrative offices are for business only and not to be used as a thoroughfare or loitering place by any student.
9. Food or drinks are not to be carried into any shop or class area.
10. Profane language or any other form of ungentlemanly conduct will not be tolerated.

TRADE PREPARATORY CURRICULUM

Air Conditioning-Refrigeration-Sheet Metal
1440 hours

First Quarter

Elements of Refrigeration---120 hours

Fundamentals of Drawing and Blueprint Reading------36 hours

Basic Electricity------------24 hours

Second Quarter

Domestic Refrigeration------120 hours

Applied Electricity----------36 hours

Applied Drafting I-----------24 hours

Third Quarter

Installation and Service of Commercial Refrigeration--120 hours

Calculations and Heat Loads for Commercial Refrig------24 hours

Applied Science--------------36 hours

Fourth Quarter

Installations and Service of Cooling Conditioning Systems-------------------120 hours

Principals of Air Conditioning---------------24 hours

Estimating for Refrigeration and Comfort Cooling--------36 hours

Fifth Quarter

Elements of Sheet Metal-----120 hours

Sales and Communication------24 hours

Calculations and Heat Loss---36 hours

Sixth Quarter

Duct and Fitting Fabrication---------------120 hours

Applied Drafting II----------36 hours

Automatic Controls I---------24 hours

Seventh Quarter

Oil Burner Installation and Service---------------120 hours

Automatic Controls II--------24 hours

Personal and Management Records--------------------36 hours

Eighth Quarter

Gas Burners, Electric Heat, and Liquid Heat Applications--------------120 hours

Estimating for Heating Systems--------------------24 hours

Management Procedures--------36 hours

DESCRIPTION OF COURSES

Elements of Refrigeration

This course will, of necessity, consist mostly of lectures, discussions, and demonstrations. Not over one-third of the time will be utilized in shop practice and experiments. Many fields are covered including essential terminology, laws of refrigeration, physical and chemical effects, materials, and tools. The compression system, compressor construction, refrigerants, controls, absorption systems, and hermetic units are a major portion of the course. Practice will be given in the use of tools in basic refrigeration jobs such as tube bending, flaring, soldering, refrigerant weighing, and other service jobs.

Fundamentals of Drawing and Print Reading

This is a course in the elements of drawing including lines, rules, view of relationship, basic orthographic projection, sections and cut-aways as applied to machine assemblies and basic floor plans and elevations. The course is designed primarily to provide the background information necessary before a study of the drawings and shop sketches of the trade can be undertaken.

Basic Electricity

This course covers the basic theories of electricity, types of electricity, methods of production, and transmission and transforming of electricity. Such factors as the electron theory, electricity by chemical action, electricity by friction, electricity by magnetism, induction, voltage, amperage, resistance, horsepower, wattage, and transformers are major parts of the course.

Domestic Refrigeration

In this course more time will be spent in actual refrigeration service practice. Classroom work and demonstrations will not occupy over one-half of the time. Discussions, demonstrations, and practice will take place on residential cabinets using conventional, hermetic, and absorption systems. Cabinet care, controls, system maintenance, and system replacement will be stressed. Typical service problems will be worked out by each student. Complete rebuilding jobs, including cabinet refinishing, will be undertaken.

Applied Electricity

In applied electricity the information presented in basic electricity is applied both in theory and in practice to the installation and service of refrigeration and conditioning systems. Transformers, motors, motor controls, system controls, electric valves, capacitors, wiring diagrams, and electrical code as it applies are among the items taken up.

Applied Drafting

A study of the prints of the trade such as machine prints, exploded prints, wiring schematics, floor plans and elevations, conditioning layouts, and equipment layouts. Practice in shop sketching, isometric sketching, and equipment layouts of prints or tracings is part of this course. It is expected that each student will become familiar with and adept at reading the prints of the trade, as well as be able to produce the necessary shop sketches.

Installation and Service of Commercial Refrigeration

This course will consist of study, demonstration, and practice in the installation and service of commercial refrigeration systems. The various commercial applications of refrigeration will be covered in classroom discussion before actual practice is given. Units to be covered will include commercial cabinets, reach-in cabinets, walk-in coolers, display cases, frozen food cabinets, ice cream cabinets, water coolers, ice makers, and other industrial applications. All standard types of compressors, condensers, coils, valves, and controls will be studied. Various systems will be installed and typical service problems worked out.

Calculations and Heat Loads for Commercial Refrigeration

This course is the basis for the design and contains the theory for service of commercial refrigeration systems. Many topics will be studied among which are heat loads, heat leakage, coil and condensing unit capacities, coil types and design, coil usage, coil capacities, cooling loads, refrigerants, latent heat, specific heat, motor sizing, and tube sizing.

Applied Science

This course is designed to acquaint the student with the basic scientific principles concerned with, or affecting the operation and physical equipment of, refrigeration, heating and air conditioning systems. Topics covered will be measurements, structure of matter, properties of solids, liquids, and gases. An analysis of basic machines and friction, temperature and effects of heat, wave motion, and sound will also be covered. Consideration will be given acids, bases and salts, and petroleums.

Installation and Service of Cooling Conditioning Systems

The course will consist of discussions, installations, and service practice on the various types of air-cooled and water-cooled conditioning systems. Types of units used will include self-contained and remote air-cooled residential and small commercial units, water-cooled units, water towers, chilled water systems, heat pumps, and automotive systems. Service of air movement systems and installation and service of controls will be stressed. Service and storage of window units will be included.

Principles of Air Conditioning

In this course the history, theory, and factors affecting air conditioning are studied and discussed. The course will cover history of air conditioning, terminology, temperature measurement, air movement, humidity, psychometric properties, comfort zone, effective temperature, ducts, air diffusion, air cleaning, ozone, testing instruments, and heat loads. Information is presented here that can never be gained by ordinary work experience.

Estimating of Refrigeration and Comfort Cooling

The objective of this course is to give students an overview of the steps in estimating a refrigeration or comfort cooling job and to give him one general method of arriving at the bid price.

Elements of Sheet Metal

Provides the student mechanic with the skill and knowledge of the basic materials, tools, and machines of the sheet metal trade.

Calculations and Heat Loss

Provides the student with a knowledge of and practice with the formulas used in calculating heat loss, sizing distribution systems, fuel consumption. This is considered a prerequisite to applied drafting II.

Sales and Communication

Communications are usually the greatest weakness of the serviceman. This course will provide the background to enable him to overcome this weakness. The student will receive instruction in customer relations, business correspondence, reporting on service diagnosis and service work, group discussions, and sales procedure.

Duct and Fitting Fabrication

A study of sheet metal layout and installation of rectangular duct systems, pattern design, and shop operations. Layout to be done on layout tables in the shop and, where practical, on the metal used.

Applied Drafting II

An extension of applied drafting I required in the second quarter.

Automatic Controls I

To teach the student the basic information about the various heating and cooling controls so that we will be able to study and understand the design and function of the control systems in use in modern air conditioning.

Oil Burner Installation and Service

Develops an understanding and working knowledge of the operation, control, and service of oil burners as used in heating of air and liquids. The course will be, of necessity, closely correlated with automatic controls I and II.

Automatic Controls II

Provides the student with the necessary knowledge to formulate the information gained in automatic controls I into an understanding of the several control methods used on various conditioning systems.

Personal and Management Records

The records that a serviceman needs to keep both for himself and his employer are the basis of this course. They will include time and material records, service call diagnosis and repair records, time and material estimates, accident reports, insurance records, and personal tax records. Parts lists, withdrawal slips, inventory record, and parts and material orders will be studied.

Gas Burners, Electric Heat, and Liquid Heat Applications

Objective is to develop the knowledge and service skills needed in installing and servicing gas furnaces, gas burners, electric heating elements and water or steam, applications as used in air conditioning.

Estimating for Heating Systems

To give the student an understanding of the necessary factors in estimating and a logical sequence of steps necessary to prepare an estimate.

Management Procedures

Some students will set up their own shops. This course is designed to provide the student with an understanding of the operation of a small business and a knowledge of the general procedure necessary for a successful operation.

TRADE PREPARATORY CURRICULUM

Automobile Mechanics
1440 hours

First Quarter

Shop Processes----------------96 hours

Mathematics (auto)------------36 hours

Basic Physics (matter)--------24 hours

Speed Reading-----------------24 hours

Second Quarter

Automotive Engines-----------108 hours

Mathematics (auto)------------24 hours

Basic Physics (electricity)--24 hours

Blueprint Reading-------------24 hours

Third Quarter

Auto Electrical Systems-------96 hours

Basic Physics (work, energy, momentum)---24 hours

Human Relations---------------36 hours

Blueprint Reading-------------24 hours

Fourth Quarter

Auto Fuel Systems-------------96 hours

Basic Physics-----------------24 hours

Technical Writing-------------24 hours

Automotive Welding------------36 hours

Fifth Quarter

Auto Power Trains------------156 hours

Physics (Gear trains and gearing)------------------24 hours

Sixth Quarter

Automotive (chassis) Suspensions and Steering--96 hours

Brakes------------------------48 hours

Industrial Organization and Management------------36 hours

Seventh Quarter

Testing and Diagnosis Procedures---------------144 hours

Automotive Air Conditioning--36 hours

Eighth Quarter

Auto Service and Repair-----132 hours

Automotive Thesis------------48 hours

DESCRIPTION OF COURSES

Shop Processes

This course will provide information concerning shop safety, grinding and boring of engines and drive shafts, as well as how to effectively arrange equipment in a shop. Students will use the latest in automotive shop equipment.

Applied Math (Auto Trades)

Math principles that are related to each subject being studied in the auto mechanics curriculum are covered in this course.

Physics

The study of matter, electricity, work, energy, and momentum will be studied in this course.

Related Science (Auto Trades)

Related science for the auto trades presents a sound background in science as it pertains to the automotive trade. Shopwork and related trade theory are correlated in the unit lesson pattern.

Speed Reading

This course utilizes the new speed reading equipment and techniques to instruct effective reading time utilization with maximum retention of information.

Automotive Engines

A course designed to provide the student with a comprehensive knowledge of the proper function of the automobile engine. The student will study the components and accessories of the engine and learn analysis and repair procedures.

Automotive Blueprint Reading

Automotive blueprint reading is designed to help the student develop the ability to read and interpret blueprints, charts, instruction and service manuals, and wiring diagrams.

Automotive Electrical Systems

This course will provide the student with a knowledge of the complete electrical system. Primary emphasis will be given to ignition system analysis and repair, although accessory circuits and the interrelationship of the various systems will be covered also.

Human Relations

Students are acquainted with a practical understanding of employer-employee relations, the effect of current issues on the individual, and the responsibilities of the individual to his community.

Automotive Fuel Systems

A study of the fuel system from pump to carburetion, including gasoline and diesel injection systems, air-fuel ratios, and adjustment and repair of components.

Technical Writing

The importance of proper nomenclature designation and the use of work orders and other forms are considered in this course.

Automotive Welding

Proper welding techniques for use in automobile chassis and body work plus the effect of heat upon various metals will be taught in this course.

Power Trains

The function and repair of manual and automatic transmissions, clutch, drive shaft, and differential.

Auto (Chassis) Suspension and Steering

This course covers front end alignment, suspension mechanics, and power as well as manual steering.

Brakes

This course will acquaint the student with the braking systems of the automobile. It will include power brakes as well as the conventional brake system.

Industrial Organization and Management

Management outlines common problems of business today. The course is designed to help the student understand when, where, and how he may best use the services of business specialists, et cetera.

Testing and Diagnosis Procedures

A thorough study of the use of the engine analyzers, dynamometers, and other automotive test equipment and their interpretation.

Automotive Air Conditioning

This course gives the student a working knowledge of the installation and adjustment of automobile air conditioning units. It is not intended to make the student an air conditioning serviceman.

Automotive Service and Repair

This course teaches maintenance of lubrication systems of automobiles and the types of lubrication necessary for proper operation of automobiles.

Automotive Thesis

This course will consist of an individual assignment to special projects dealing with analysis and repair of any or all automotive systems. The assignment will be designed to have the student display a comprehensive knowledge of auto mechanics.

TRADE PREPARATORY CURRICULUM

Technical Drafting
1440 hours

First Quarter

Introduction to Drafting----120 hours

Mathematics-----------------30 hours

Basic Physics---------------30 hours

Second Quarter

Instrumental Drawing--------120 hours

Mathematics-----------------30 hours

Basic Physics---------------30 hours

Third Quarter

Working Drawings------------120 hours

Mathematics-----------------30 hours

Basic Physics---------------30 hours

Fourth Quarter

Working Drawings------------120 hours

Mathematics-----------------30 hours

Manufacturing and Production
Processes-----------------30 hours

Fifth Quarter

Assembly and Layout---------120 hours

Mathematics-----------------30 hours

Manufacturing and Production
Processes-----------------30 hours

Sixth Quarter

Exploratory Drafting--------120 hours

Mathematics-----------------30 hours

Manufacturing and Production
Processes-----------------30 hours

Seventh Quarter

Exploratory Drafting--------120 hours

Mathematics-----------------30 hours

Communications and Report
Writing-------------------30 hours

Eighth Quarter

Specialized Drafting--------120 hours

Mathematics-----------------30 hours

Industrial Relations---------30 hours

DESCRIPTION OF COURSES

Introduction to Drafting

This initial course in drafting is divided into the following areas:

Orientation	4 hours
Selection, care, and use of instruments	30 hours
Lettering and tracing	40 hours
Freehand sketching	46 hours

Instrumental Drawing

This course offers instruction in the basic requirements of projection drawings by using orthographic, isometric, and auxiliary views; the use of revolutions, developments, intersections, solutions of space problems by graphics or projection; the drawings of parts and views, dimensioning with proper tolerances for various types to fit as required for the manufacture or fabrication of the part.

Working Drawings

The student is given problems typical of the kind he might be called upon to solve. He selects a layout and makes a drawing involving use of dimensions, notes, materials, finish specifications, and selection required for manufacturing.

Assembly and Layout

This course offers instruction in making working drawings, assemblies, group assemblies, and design assemblies, and how to show parts of mechanisms and structures in their working order.

Exploratory Drafting

Students will do exploratory drafting in each of the following areas:

Architectural Drafting	40 hours
Structural Drafting	30 hours
Tooling and Machine Drafting	40 hours
Electro-Mechanical Drafting	30 hours
Topographical and Map Drafting	20 hours
Sheet Metal Drafting	30 hours
Aircraft Drafting	20 hours
Electronic Drafting	30 hours

Specialized Drafting

Each student will select one of the above areas and pursue an advanced program of drafting in that field.

Mathematics

This course reviews the principles of arithmetic and offers training in the use of algebra, geometry, and trigonometry. Calculations required for gearing, cams, part speeds, and metal sizes and weights are introduced.

Basic Physics

Areas introduced in this course are heat, sound, light, electricity and magnetism, physical electronics, electrical measurements and instruments, noise and vibration, and mechanics.

Manufacturing and Production Processes

This course offers instruction in the selection and use of machine tools and related equipment, production methods and manufacturing processes, and the inspection and quality control methods used in industry.

Communications and Report Writing

This course emphasizes exercises in writing, speaking, and listening as well as the techniques of collecting and presenting scientific data. The pattern of instruction is geared principally to helping students improve skills in areas where common weaknesses are found. Forms and procedures for technical reports are studied. Developing and improving skills in the writing of technical reports are introduced.

Industrial Relations

Instruction in this subject covers personnel relations, civic and employment responsibility, state and federal regulations, and health measures. The course acquaints the student with the necessity of cooperation with fellow draftsmen in the preparation of drawings.

TRADE PREPARATORY CURRICULUM

Electronics
1440 hours

First Quarter

Basic Electricity (DC)-------96 hours

Math I-----------------------60 hours

Shop Procedures I------------24 hours

Second Quarter

Basic Electricity (DC)-------60 hours

Basic Electricity (AC)-------36 hours

Math II----------------------36 hours

Shop Procedures II-----------24 hours

Technical Drawing------------24 hours

Third Quarter

Basic Electricity (AC)------120 hours

Math II----------------------24 hours

Basic Electronics I----------12 hours

Technical Drawing------------24 hours

Fourth Quarter

Basic Electronics I----------36 hours

Basic Electronics II---------96 hours

Graphical Analysis-----------24 hours

Technical Drawing------------24 hours

Fifth Quarter

Industrial Electronics------120 hours

Graphical Analysis-----------36 hours

Technical Drawing------------24 hours

Sixth Quarter

Industrial Electronics-------36 hours

Math III---------------------48 hours

Transistor Theory------------48 hours

Technical Drawing------------24 hours

Communications Skills--------24 hours

Seventh Quarter

Circuit Analysis-------------72 hours

Transistor Application-------84 hours

Communication Skills---------24 hours

Eighth Quarter

Special Circuit Design------156 hours

Technical Report Writing-----24 hours

COURSE DESCRIPTIONS

Basic Electricity (DC) - Theory

An introduction to electricity: electron theory of the structure of matter, electrical units, prefixes, use of meters, conductors, insulators, primary and secondary cells, Ohm's Law, series and parallel circuits, combination circuits, Kirchhoff's Laws, magnetism, electro-magnetism, inductance, DC motors and generators, meter design, capacity and R-C time constants.

Basic Electricity (DC) - Lab

The measurement of voltage, current, resistance and power in DC circuits; application of Ohm's Law to series, parallel and series parallel circuits; Kirchhoff's Laws applied to mesh circuits; conductors and insulator; investigation of magnetic fields and the properties of magnetic lines; design of meter shunts and multipliers; R-C constants.

Mathematics I

A review of fundamental processes found in mathematics; whole numbers, fractions, decimals, ratio, percentages, square roots, positive and negative numbers, powers of 10, introduction to slide rule, algebraic equations, transposition of equations, solutions involving two or more unknowns, laws of exponents, logarithms, log tables and slide rule solution of problems using the log scales.

Shop Procedures I

The purpose of this course is to teach the correct selection and use of hand tools used by the electronics technician. Practical application of this information is gained through shop projects in soldering, sawing, filing, drilling, and tapping of metal stock.

Basic Electricity (AC) - Theory

Sine wave development, characteristics of inductance, inductive reactance, capacity, capacitive reactance and impedance; R-L and R-C circuits; series and parallel RLC circuits; series and parallel resonant circuits; band width and q of resonant circuits; impedance and phase angle of tuned circuits; power and power factor.

Basic Electricity (AC) - Lab

Experiments that deal with determining; inductance, inductive reactance, capacity and capacitive reactance, phase angle and impedance of R-L, R-C, and R-LC circuits; resonant frequency of series and parallel RLC circuits; exercises in plotting impedance for series and parallel circuits as a function of frequency. Determination of true power.

Mathematics II

Trigonometry; sine, cosine, and tangent functions, resolution of forces to yield to solution as a right triangle; quadratic equations, imaginary and real numbers, the complex number, polar and rectangular form of complex numbers, operator J and its application to electronics, use of the slide rule in the solution of complex numbers.

Shop Procedures II

An introduction to blueprint reading and layout work. The correct method of bending, forming, and drilling of sheet metal as applied to chassis layout and construction. Practical application is gained through a shop project on chassis construction. The chassis will be used by the student later in the course.

Technical Drawing

A course designed to teach the fundamentals of drawing and drafting-room practices; the use of templates in electronic circuit drafting; the reading of terms and symbols used in schematic circuit diagrams associated with electronics systems.

Basic Electronics I - Theory

Vacuum tubes and semiconductors; diode characteristics and application, triode characteristics and applications, tetrodes and pentodes, selenium rectifiers, germanium diodes, silicon diodes, transistors.

Basic Electronics I - Lab

The diode as a rectifier, the effect of the triode grid, amplification factor, plate resistance, characteristic curves, selenium rectifiers, crystal diodes, semiconductor diode characteristics.

Basic Electronics II - Theory

Power supplies, voltage multipliers, filter circuits, voltage regulators, voltage dividers, low frequency amplifiers, phase inverters, tuned circuits, phase splitters, high frequency amplifiers, test equipment.

Basic Electronics II - Lab

Power transformers, voltage doubler, filter circuit design, voltage divider design, amplifier circuits, phase inverter, phase splitter, the CRO.

Graphical Analysis

A course in which the student studies graphic representation of electronic circuits and learns to interpret graphs presenting component or circuit conditions. The correct method of plotting graphs using linear, semi-log, log-log, and polar graph paper.

Industrial Electronics - Theory

A study of electronic circuits most frequently found in industry: time delay circuits, gas tubes, rectifiers and voltage regulators, photo electric circuits, relays, high frequency applications, induction and electrostatic heating, industrial X-rays, electronic motor controls, syncro and servo systems, magnetic amplifiers and saturable reactors.

Industrial Electronics - Lab

Time delay circuits, thyratron circuits, rectifier circuits, voltage regulators, photo electric relay circuits, syncro circuits, saturable reactors and magnetic amplifiers.

Mathematics III

A study of more advanced mathematics; limits of functions, rates and derivatives, intergration, differentation and simple harmonic motion.

Transistor Theory - Theory

Conductors, semiconductors, free electrons and holes, impurity atoms, Hall effect, fermi level, junctions, zener diode, tunnel diode, noise and temperature effects.

Transistor Theory - Lab

Study of junction transistor parameters, investigation of response of circuits to frequency and temperature change.

Communications Skills

A review of basic elements of writing, speaking, listening and reading to enhance these skills in the areas as they apply to the field of electronics.

Transistor Applications - Theory

Transistor circuit design; amplifiers, load lines, transistor oscillators, frequency converters, rectifiers, and time delay circuits.

Transistor Applications - Lab

Circuit design of low signal amplifiers, power amplifiers, oscillators, and time delay circuits.

Circuit Analysis - Theory

A study of circuitry and circuit tracing, trouble shooting techniques, analysis of circuit operation and variations observed as a result of changing component values.

Circuit Analysis - Lab

Trouble shooting and circuit tracing, analysis of circuit operation.

Circuit Design and Analysis - Theory

A study of acoustics, power level in Db, attenuator design, transformer design, amplifier design, test equipment circuitry, multivibrators, phantastron and other time delay circuits, paraphase amplifiers and cathode followers.

Circuit Design and Analysis - Lab

Frequency response characteristics of amplifiers, design of a class C power amplifier, observation and interpretation of wave forms obtained from multivibrator circuits, phase relations and gain characteristics of paraphase amplifiers, and impedance matching characteristics of cathode followers.

Technical Report Writing

To provide the student with the ability to prepare a complete and accurate technical report in the field of electronics. Emphasis is placed on conciseness, directness, clarity, and precision. Formal and informal reporting is covered in detail.

Electronics Technology
2160 hours

First Quarter

Basic Electricity (DC)-------96 hours

Math I----------------------60 hours

Shop Procedures I------------24 hours

Second Quarter

Basic Electricity (DC)-------60 hours

Basic Electricity (AC)-------36 hours

Math II---------------------36 hours

Shop Procedures II-----------24 hours

Technical Drawing------------24 hours

Third Quarter

Basic Electricity (AC)------120 hours

Math II---------------------24 hours

Basic Electronics I----------12 hours

Technical Drawing------------24 hours

Fourth Quarter

Basic Electronics I----------36 hours

Basic Electronics II---------96 hours

Graphical Analysis-----------24 hours

Technical Drawing------------24 hours

Fifth Quarter

Industrial Electronics------120 hours

Graphical Analysis-----------36 hours

Technical Drawing------------24 hours

Sixth Quarter

Industrial Electronics-------36 hours

Math III--------------------48 hours

Sixth Quarter - continued

Transistor Theory------------48 hours

Technical Drawing------------24 hours

Communications Skills--------24 hours

Seventh Quarter

Circuit Analysis-------------72 hours

Transistor Application-------84 hours

Communication Skills---------24 hours

Eighth Quarter

Special Circuit Design------156 hours

Technical Report Writing-----24 hours

Ninth Quarter

UHF and Microwave-----------156 hours

Physics---------------------24 hours

Tenth Quarter

Transmission of RF----------156 hours

Physics---------------------24 hours

Eleventh Quarter

Research Report--------------96 hours

Option----------------------60 hours

Physics---------------------24 hours

Twelfth Quarter

Research Report--------------12 hours

Option----------------------96 hours

Physics---------------------24 hours

Social Science---------------48 hours

COURSE DESCRIPTIONS

Basic Electricity (DC) - Theory

An introduction to electricity: electron theory of the structure of matter, electrical units, prefixes, use of meters, conductors, insulators, primary and secondary cells, Ohm's Law, series and parallel circuits, combination circuits, Kirchhoff's Laws, magnetism, electro-magnetism, inductance, DC motors and generators, meter design, capacity and R-C time constants.

Basic Electricity (DC) - Lab

The measurement of voltage, current, resistance and power in DC circuits; application of Ohm's Law to series, parallel and series parallel circuits; Kirchhoff's Laws applied to mesh circuits; conductors and insulator; investigation of magnetic fields and the properties of magnetic lines; design of meter shunts and multipliers; R-C constants.

Mathematics I

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Sine wave development, characteristics of inductance, inductive reactance, capacity, capacitive reactance and impedance; R-L and R-C circuits; series and parallel RLC circuits; series and parallel resonant circuits; band width and q of resonant circuits; impedance and phase angle of tuned circuits; power and power factor.

Basic Electricity (AC) - Lab

Experiments that deal with determining; inductance, inductive reactance, capacity and capacitive reactance, phase angle and impedance of R-L, R-C, and R-LC circuits; resonant frequency of series and parallel RLC circuits; exercises in plotting impedance for series and parallel circuits as a function of frequency. Determination of true power.

Mathematics II

Trigonometry; sine, cosine, and tangent functions, resolution of forces to yield to solution as a right triangle; quadratic equations, imaginary and real numbers, the complex number, polar and rectangular form of complex numbers, operator J and its application to electronics, use of the slide rule in the solution of complex numbers.

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Basic Electronics I - Lab

The diode as a rectifier, the effect of the triode grid, amplification factor, plate resistance, characteristic curves, selenium rectifiers, crystal diodes, semiconductor diode characteristics.

Basic Electronics II - Theory

Power supplies, voltage multipliers, filter circuits, voltage regulators, voltage dividers, low frequency amplifiers, phase inverters, tuned circuits, phase splitters, high frequency amplifiers, test equipment.

Basic Electronics II - Lab

Power transformers, voltage doubler, filter circuit design, voltage divider design, amplifier circuits, phase inverter, phase splitter, the CRO.

Graphical Analysis

A course in which the student studies graphic representation of electronic circuits and learns to interpret graphs presenting component or circuit conditions. The correct method of plotting graphs using linear, semi-log, log-log, and polar graph paper.

Industrial Electronics - Theory

A study of electronic circuits most frequently found in industry: time delay circuits, gas tubes, rectifiers, and voltage regulators, photo electric circuits, relays, high frequency applications, induction and electrostatic heating, industrial X-rays, electronic motor controls, syncro and servo systems, magnetic amplifiers and saturable reactors.

Industrial Electronics - Lab

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Mathematics III

A study of more advanced mathematics; limits of functions, rates and derivatives, intergration, differentation and simple harmonic motion.

Transistor Theory - Theory

Conductors, semiconductors, free electrons and holes, impurity atoms, Hall effect, fermi level, junctions, zener diode, tunnel diode, noise and temperature effects.

Transistor Theory - Lab

Study of junction transistor parameters, investigation of response of circuits to frequency and temperature change.

Communications Skills

A review of basic elements of writing, speaking, listening and reading to enhance these skills in the areas as they apply to the field of electronics.

Transistor Applications - Theory

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Transistor Applications - Lab

Circuit design of low signal amplifiers, power amplifiers, oscillators, and time delay circuits.

Circuit Analysis - Theory

A study of circuitry and circuit tracing, trouble shooting techniques, analysis of circuit operation and variations observed as a result of changing component values.

Circuit Analysis - Lab

Trouble shooting and circuit tracing, analysis of circuit operation.

Circuit Design and Analysis - Theory

A study of acoustics, power level in Db, attenuator design, transformer design, amplifier design, test equipment circuitry, multivibrators, phantastron and other time delay circuits, paraphase amplifiers and cathode followers.

Circuit Design and Analysis - Lab

Frequency response characteristics of amplifiers, design of a class C power amplifier, observation and interpretation of wave forms obtained from multivibrator circuits, phase relations and gain characteristics of paraphase amplifiers, and impedance matching characteristics of cathode followers.

Technical Report Writing

To provide the student with the ability to prepare a complete and accurate technical report in the field of electronics. Emphasis is placed on conciseness, directness, clarity, and precision. Formal and informal reporting is covered in detail.

UHF and Microwave - Theory

Introduction to UHF circuits, tubes and components, microwave pulsed radar, timer circuits, pulse forming networks, switching circuits, broad band amplifiers, transmission lines, wave guides and cavity resonators.

UHF and Microwave - Lab

Clippers, clampers, multivibrators, and other circuits found in UHF and microwave applications.

Physics (Mechanics)

To give the student a knowledge of, and appreciation for, the basic physical principles of mechanics as related to electronic technology. Covered in detail are levers, fulcrums, gears, pulleys, cams, heat, metal expansion with temperature increase, liquids and gases.

Transmission of RF Energy - Theory

A course to provide the student with a knowledge of techniques and circuitry involved in the transmission of RF energy. A review of complex numbers and vectors, series and parallel resonance, oscillator circuits, RF power amplifiers, frequency multipliers, modulation, electromagnetic waves and antennas.

Transmission of RF Energy - Lab

Study of effects of stray capacity and inductance, use of Q meter, construction of self-excited oscillator, RF power amplifiers, modulators and types of modulation, and design of networks.

Research Report

To give the student the ability to do comprehensive research on a special project and present his findings in a scientific manner.

Option

Courses are designed to give the student advance training in one of the comprehensive areas in which he wishes to specialize.

Social Science

A brief introduction to the four basic social sciences: psychology, sociology, economics, and government.

TRADE PREPARATORY CURRICULUM

Machine Shop
1440 hours

First Quarter

Machine Shop Theory and Practice---------------96 hours

Applied Mathematics I--------36 hours

Blueprint Reading and Sketching-----------------24 hours

Applied Science--------------24 hours

Second Quarter

Machine Shop Theory and Practice---------------96 hours

Applied Mathematics II-------36 hours

Blueprint Reading and Sketching-----------------24 hours

Applied Science II Electricity---------------24 hours

Third Quarter

Machine Shop Theory and Practice---------------96 hours

Applied Mathematics III------36 hours

Blueprint Reading and Sketching-----------------24 hours

Applied Science III Electricity---------------24 hours

Fourth Quarter

Machine Shop Theory and Practice-------------108 hours

Applied Mathematics IV-------48 hours

Blueprint Reading and Sketching-----------------24 hours

Fifth Quarter

Machine Shop Theory and Practice-------------108 hours

Structure of Metals-----------36 hours

Industrial Communications----36 hours

Sixth Quarter

Machine Shop Theory and Practice-------------120 hours

Heat Treating Practice-------36 hours

Human Relations--------------24 hours

Seventh Quarter

Machine Shop Theory and Practice-------------120 hours

Welding----------------------60 hours

Eighth Quarter

Machine Shop Theory and Practice-------------120 hours

Industrial Specifications----24 hours

Industrial Organization and Management------------36 hours

DESCRIPTION OF COURSES

Machine Shop Theory and Practice

This course is an introduction to the machinist trade and the potential it holds for the craftsman. It will deal primarily with the identification, care, and use of basic hand tools, basic layout tools, and materials, and an introduction of off-hand grinding procedures and drill press operation. Processes will consist of lathe, drill press, grinding, and milling machines. The course will cover calculation, cutting, and measuring of sphere, helical, worm gears, and wheels.

Applied Science

A unit designed to lay the foundation for a better understanding of applied math. This course begins with simple mathematical situations dealing with fractions, decimals, conversion of one to the other, short methods and checks, percentage and applications, ratio and proportions, power and roots. This course will continue into advanced mathematics.

Blueprint Reading (metal trades)

A course in the interpretation and reading of blueprints used by industry. It will contain information on the basic principles of the blueprint, lines, views, and dimensioning procedures and notes.

Applied Science

An introductory course in physics and its application. It will cover elementary mechanics units of measurement, velocity, force, motion, energy, torque, work, and power.

Electricity I (motors)

Basic unit in the field of electricity and motors. The trainee will cover units in the nature, quantities, and application of electricity. Emphasis will be placed on types, care, and uses of motors as they apply in the laboratory and machine shop.

Structure of Metals

Elementary and practical approach to metals, their structure, markings, classifications, and uses. Interpretation and specifications of steels and their properties by the use of manuals, catalogs, charts, et cetera.

Industrial Communication

To develop to the trainee's ability to describe in a clear, concise manner aspects of his job or position and work problems and suggestions pertaining to his job. To develop ability to ask clear, intelligent questions and to communicate generally with his co-workers, supervisors, and related departments.

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Heat Treating Practice

A practical approach to principles and procedures of heat treating. Types of metal and heat treating methods, flame hardening, induction hardening, pack carburizing, gas carburizing, cyanide hardening, et cetera will be units covered. Heat treating terminology and testing procedures and equipment will be studied from the practical and applied approach. Lecture, demonstration, and laboratory experiments will be utilized during the course.

Human Relations

This course is adapted to the development of one's responsibility in his chosen occupation and to promote his ability to "get along with his fellow workers or associates."

Welding Practice

Basic welding procedures and practice. The trainee will gain experience in the gas welding of small parts and tools. This will introduce gas welding as it would apply to the machinist in the repairs and manufacture of tools and equipment.

Specifications

A course developed to inform the trainee on the "what" and the "why" of specifications. Machine tool and hand tool specifications as well as job and procedure sheets will be studied and organized. Catalogs, specification sheets, manufacturer's handbooks will serve as reference sources.

Industrial Management

This course will acquaint the student with the methods, techniques, and practices of modern management in planning, organizing, and controlling operations of a manufacturing concern.

TRADE PREPARATORY CURRICULUM

Welding
720 hours

First Quarter

Welding Theory and Practice--96 hours

Applied Math-----------------24 hours

Manufacture of Metals--------36 hours

Applied Science--------------24 hours

Second Quarter

Welding Theory and Practice--96 hours

Applied Math-----------------28 hours

Blueprint Reading------------32 hours

Electricity------------------24 hours

Third Quarter

Welding Theory and Practice--96 hours

Blueprint Reading------------36 hours

Properties and Identification of Metals-----------------18 hours

Heat Treatment of Metals-----18 hours

The Welding Shop-------------12 hours

Fourth Quarter

Welding Theory and Practice--96 hours

Blueprint Reading------------32 hours

Strength of Welded Joints----16 hours

Cost of Welding--------------12 hours

Industrial Relations and Management----------------24 hours

DESCRIPTION OF COURSES

Welding Theory and Practice

This will be an introduction to the history of oxyacetylene welding, the different types of flames and what each is used for, the oxyacetylene equipment and how to assemble it, lighting and shutting off the torch, types of gas welding operations, puddling and carrying the puddle, running a bead, butt welding, corner joint welding, fillet welding, vertical welding, horizontal welding, overhead welding, the correct appearance of each type weld. This course also includes the study of oxyacetylene welding equipment and supplies (including the cylinders, gauges, regulators, welding hose, the equal-pressure type torch, the injector-type torch), the safety of the equipment and safety equipment for the operator. This course will continue into advanced work.

Applied Math

Instruction in this subject covers general mathematics dealing with fractions, decimals, conversion of one to the other, percentages, and ratio and proportions, advancing into geometry.

Manufacture of Metals

This unit will cover the history of manufacturing, methods of manufacturing steel, the modern blast furnace, cast iron, malleable iron, wrought iron, steel, the open-hearth furnace, Bessemer furnace, the electric furnace, and the crucible furnace, manufacturing stainless steel, manufacturing brass and bronze, aluminum and zinc, shaping of metals.

Applied Science

This covers basic physics in measurements, velocity, force, motion, energy, solids, liquids, and gases; emphasis on oxygen, acetylene, nitrogen, argon, and helium.

Blueprint Reading

This is a course in industrial blueprint reading pertaining to welded types of structures, basic blueprint reading covering reasons for blueprints, and their construction (including lines, views, dimensioning procedure, and notes).

Properties and the Identification of Metals

The student learns the physical properties of iron and steel, alloy metals, effects of carbon on steel and iron, the iron carbon diagram, the identification of steels by the spark test, chemical tests to identify metals, the specific gravity method of identification, S.A.E. numbering system, nonferrous metals, hard surfacing.

Heat Treatment of Metals

The purpose of heat treating; characteristics of steel; crystalline structure; hardening steel, tempering steel, annealing steel; case hardening; heat treating cast iron; heat treating copper; heat treating aluminum are included in this unit.

The Welding Shop

This course covers method of setting up a welding shop; materials needed such as welders, power tools, cleaning equipment, care and repair of equipment; shop safety; housecleaning.

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